Volatility in Arab Stock Markets

Riad Dahel

Arab Planning Institute
Kuwait

1. Introduction

The efficient market hypothesis (EMH) is based on the notion that stock prices quickly and fully reflect all available information. Over the last three decades, the EMH has been tested extensively and continues to be tested as more advanced econometric techniques are being developed. In a recent two-volume set devoted entirely to market efficiency, Lo (1997) puts together the leading articles on the subject. The editor classifies empirical testing of the EMH in four categories. The first category is based on the random walk hypothesis. If stock prices follow a random walk, price changes over time are random. Tests in this category involve the question of whether all information contained in the sequence of past prices is fully reflected in the current price. The second category is concerned with the volatility of prices. The third category tests the EMH by considering investors' reactions to new information, whether they overreact or underreact. Finally, the fourth category tests whether an observed anomaly, that is, a regular and reliable pattern in stock return which implies predictability, constitutes a violation of the EMH.

Excessive volatility of stock prices is an important phenomenon to investigate because of its negative effect on risk-averse investors, and ultimately on the economy. The volatility tests, also called variance bounds tests, were initially developed by Shiller (1979, 1981) and LeRoy and Porter (1981). These tests, using the dividend-discount model, are based on a decomposition of the variance of the ex post present value of all future dividends into the variance of the market price and the variance of the forecast error. If the variance of stock prices exceeds that of ex post present values, then the variance bound is violated. Whether a violation of the variance bound implies that the EMH is false is still being debated in the literature.[1]

Regardless of the debate over empirical testing of volatility, the fact remains that volatility is a relative measure. In effect, as stated by El Erian and Kumar (1995), "In theory, while it is difficult to have a clear criterion for defining the degree of "excessiveness", in practice, the standard usually

---

[1]For a discussion of this issue and the modelling of volatility clustering in the returns with autoregressive conditional heteroskedasticity (ARCH) and generalized ARCH (GARCH) models, see Bollerslev and Hodrick (1995).

adopted is that of the volatility of the established industrial country stock markets" (p.155).

This purpose of this paper is to investigate whether Arab stock markets are characterized by excessive volatility of returns. To this end, the study includes, in addition to eight Arab stock markets for which data is available over the sample period selected, two emerging and three developed markets. The data set consists of weekly stock price indexes of those markets over the period extending from October 1994 to November 1998.

Section 2 provides a brief background on the markets included in the study with a focus on Arab markets. Section 3 discusses the data and summary statistics. Section 4 provides some measures of volatility and section 5 concludes.

2. Characteristics of the Markets

The Arab markets included in this study are the following: Bahrain, Egypt, Jordan, Kuwait, Morocco, Oman, Saudi Arabia and Tunisia. By international standard, Arab markets are considered relatively new. Four of them (Bahrain, Jordan, Oman, and Saudi Arabia) started operating over the last two decades, while others (Egypt and Morocco in particular) have been in existence for much longer but until recently their level of activity was not significant.[2]   The other markets included in the study belong to two different groups: India and Mexico are emerging markets; Japan, the United Kingdom (U.K.) and the United States (U.S.) are developed markets.[3]

---

[2]For a discussion of the development of Arab markets, see Arab Monetary Fund (1997).

[3]Although all Arab markets are emerging markets and three of them (Egypt, Jordan and Morocco) are included in the IFC indexes for emerging markets, the distinction in this study between Arab and emerging markets is made only for the purpose of the analysis.

In terms of market accessibility to foreign investors, there are significant differences between Arab markets. Whereas Egypt, Jordan and Morocco are freely available to foreign investors, Oman and Tunisia restrict foreign ownership to 49 percent of common stock of listed companies. Bahrain restricts foreign ownership to 49 percent for Gulf Cooperation Council (GCC) nationals, and to 24 percent for other investors but only in a limited number of companies. Kuwait limits ownership to GCC nationals, but does not put any ceiling on their investment. Saudi Arabia allows only GCC nationals to own a limited number of shares and in a limited number of companies.[4] With respect to the other markets, only India imposes some restrictions on foreign ownership which is currently limited to 24 percent of stock of listed companies.[5]

Table 1 presents some indicators on the markets included in the study. With respect to market capitalization, Arab markets are small by international standard; their total capitalization constitutes less than 2 percent of that of the U.S. market and only about 85 percent of that of Mexico, an emerging market. Within the group of Arab markets, the Saudi Arabian market is the largest with a share of about 37 percent of the total, followed by Egypt and Kuwait.

In terms of monthly turnover, which is the ratio of the monthly trading value to market capitalization at the end of the month, the Kuwaiti market is the most active among Arab markets and is surpassed only by the U.S. market of all the markets covered. Oman and Egypt can also be characterized as active markets.

---

[4]For more details on the status of openings by Arab markets, see Arab Monetary Fund (1997).

[5]For a list of specific ceilings on foreign investment in emerging markets, see IFC (1998).

Table 1. Stock Markets: Some Indicators

Market	Market Capitalization (millions of U.S. Dollars)	Monthly Trading Value (millions of U.S. Dollars)	Turnover Ratio (Percent)	Number of Listed Companies
Arab Markets (September 1998)				
Bahrain	7694.84	69.30	0.90	42
Egypt	24046.55	513.60	2.13	770
Jordan	5800.28	27.82	0.48	150
Kuwait	21836.33	1445.98	6.62	76
Morocco	16830.75	141.37	0.84	51
Oman	5392.53	144.49	2.68	134
Saudi Arabia	49102.58	805.53	1.64	73
Tunisia	2276.81	10.35	0.45	38
Emerging Markets (December 1997)				
India	128466	4610	3.59	5843
Mexico	156595	3829	2.44	198
Developed Markets (December 1997) *				
Japan	2216699	104312.50	4.70	2387
United Kingdom	1996225	69094.25	3.46	2046
United States	11308779	851339.50	7.53	8851

Note: *The monthly trading value for the developed markets is the monthly average for 1997.

Data Sources: For Arab Markets: Arab Stock Markets Data Base, Arab Monetary Fund, Third Quarter 1998. For Emerging and Developed Markets: Emerging Stock Markets Factbook 1998, IFC.

The number of listed companies by itself can provide an indication of the choice of firms available to an investor. In this case, Egypt stands out among Arab markets with a total number of listed companies reaching 770 at the end of September 1998. However, if the number of listed companies is used in conjunction with market capitalization, it will indicate the average market value of listed companies. In this case, Saudi Arabia has by far the highest market value per listed company among Arab markets, at about $672

million followed by Morocco at $330 million, with Egypt having the lowest market value per listed company at $31 million. Between the two emerging markets, the gap is huge with India at about $22 million and Mexico at $790 million. The developed markets lead the way in this category with the average value of a listed U.S. company at over $1.2 billion followed by listed companies in the U.K. and Japan.

As mentioned earlier, testing of the EMH has resulted in a very large number of studies, but until the early 1990s most of them focused on developed markets. However, in recent years, researchers have become more interested in emerging markets. Indeed, there has been a growing number of studies on emerging markets, dealing with issues traditionally tackled in mature markets. With the exception of Jordan, most of those studies did not include Arab markets in their group of emerging markets.[6] The lack of detailed information on Arab markets may have been the main cause behind what appears to be a lack of interest in these markets. Nevertheless, a few empirical studies have been undertaken exclusively on Arab markets. They have examined the issue of market efficiency, using a series of tests.[7] However, these studies did not make volatility in Arab markets their main focus.[8]

---

[6]See, for instance, Bekaert (1995), Buckberg (1995) and Harvey (1995).

[7]These studies include Butler and Malaikah (1992), Al-Loughani (1995, 1997), Darrat and Hakim (1997 – they also examined the issue of integration), and Dahel and Laabas (1998).

[8]El Erian and Kumar, for instance, provided some figures on volatility using the standard deviation of the percentage change in prices as a measure of volatility; however, they included only Jordan from Arab countries in their sample.

3. Data and Summary Statistics

The data used in this study consists of weekly stock price indexes for 13 markets, and the sample period extends from October 25, 1994 to November 17, 1998.[9] For Arab markets, the data are taken from MEED, and for emerging and developed markets they come from The Economist. Figure 1 depicts the behavior of the weekly returns in all 13 markets which are calculated as the percentage change in the indexes.

Figure 1. Weekly Market Returns

Arab Markets

---

[9]The indexes used for the 13 markets are: Bahrain: Bahrain Stock Exchange (BSE); Egypt: Egyptian Stock Exchange (ESE) general; Jordan: Amman Financial Market (AFM); Kuwait: Kuwait Stock Exchange (KSE); Morocco: Casablanca Finance Group (CFG); Oman: Muscat Securities Market (MSM); Saudi Arabia: National Center for Financial and Economic Information (NCFEI); Tunisia: Bourse des Valeurs Mobilieres de Tunis (BVMT); India: F.E Bombay; Mexico: BMV General; Japan: Nikkei; United Kingdom: Financial Times (FT) 100; United States: Dow Jones Industrial Average (DJIA).

Emerging Markets

Developed Markets

For the group of Arab markets, the graphs show that the returns in the GCC markets behaved rather similarly in the last quarter of the sample period which coincided with the downturn in world oil prices beginning in the last quarter of 1997. In addition to the downward trend in returns which reflected the impact of oil prices on those economies, volatility of the returns also increased over this period particularly in the case of Oman. For the other four Arab markets, the returns do not show any particular trend except for a few cases of sudden jump or drop caused by specific market developments or the increased volatility in the case of Egypt over a period extending from the last quarter of 1996 to the beginning of 1998 which corresponded to the significant increase in the pace of privatization.

For the groups of emerging and developed markets, the graphs seem to indicate some volatility of the returns throughout the sample period. However, the band of this volatility appears to have been narrower in the developed markets than in the emerging markets. For India and Mexico, the biggest drop in the market indexes coincided with the Mexican crisis of late 1994. For Japan and the U.K., the markets experienced their biggest drop in the fall of 1997 at the height of the Asian crisis with the U.K. market index decreasing as much during the Russian crisis in August 1998. But this latest crisis impacted the most on the U.S. market (after the Mexican market) which had in early September 1998 the biggest decrease in its index for the whole sample period.

Table 2 presents summary statistics of the weekly returns in all 3 groups of markets for the full sample period. The mean returns in Arab markets range from 0.4 percent in Morocco to about 0 percent in Tunisia. For the other markets, India has the lowest mean return at –0.1 percent while the U.S. has the highest at 0.4 percent. With respect to total risk, the standard deviation of returns in Arab markets ranges from a high of 2.4 percent in Oman to a low of almost 1.4 percent in Tunisia. Except for Japan, the standard deviation of returns in developed markets is within the range of that in Arab markets. However, with a standard deviation of returns above 4 percent, the group of emerging markets exhibits the highest level of risk of all markets included in this study.

Table 2. Summary Statistics: Weekly Returns
(October 25, 1994-November 17, 1998)

Market	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis	Bera-Jarque
Arab Markets								
Bahrain	0.001686	0.000453	0.068736	-0.050197	0.015709	0.675022	6.452247	121.3756
Egypt	0.002029	-0.000212	0.094951	-0.054749	0.020941	1.552187	7.870112	294.6369
Jordan	0.000626	-0.001507	0.064604	-0.052667	0.016188	0.597825	5.105245	51.77780
Kuwait	0.003108	0.001600	0.065745	-0.079565	0.019546	-0.156997	4.690469	26.11380
Morocco	0.004390	0.002608	0.062714	-0.059899	0.014618	0.509528	7.393545	179.6851
Oman	0.002932	0.001540	0.102636	-0.073970	0.024455	0.356613	5.325460	52.26202
Saudi Arabia	0.000481	0.000362	0.070678	-0.058907	0.017521	0.082360	4.926048	33.00833
Tunisia	-0.000088	0.000356	0.055717	-0.085189	0.013943	-1.185629	13.27067	981.4682
Emerging Markets								
India	-0.001132	0.002190	0.171174	-0.135441	0.040625	0.415888	4.479227	25.55968
Mexico	0.002783	-0.001710	0.159056	-0.128955	0.044289	0.259814	4.755617	29.75082
Developed Markets								
Japan	-0.000920	-0.001623	0.124153	-0.077528	0.028633	0.596773	5.122876	52.63902
United Kingdom	0.003103	0.003382	0.062147	-0.055830	0.018568	-0.092421	3.675269	4.350126
United States	0.004278	0.005878	0.069069	-0.086937	0.020127	-0.801158	5.743239	89.57340

Data Sources: MEED for Arab markets and The Economist for emerging and developed markets, various issues.

Regarding the distribution of returns, the figures show that among Arab markets those for Egypt are highly skewed to the right while those for Tunisia are highly skewed to the left. For the other markets, returns in the U.S. market are highly skewed to the left. As to the measure of peakedness of the returns, it is high for all Arab markets but particularly in the case of Tunisia. For the other markets, the coefficient of kurtosis ranges from a high of 5.7 for the U.S. to a low of 3.6 for the U.K. Finally, the Bera-Jarque statistic which tests whether the returns are normally distributed, confirms the results on distribution. The null hypothesis of normality is rejected in all cases but that of the U.K.

In its weak form, the efficient market hypothesis is based on the notion that stock prices quickly and fully reflect all historical data. One major type of testing of this form of efficiency is based on the random walk hypothesis. If stock prices follow a random walk, price changes over time are random. Thus, stock returns are independent over time. One test of the random walk hypothesis is that of the autocorrelations of the returns. Table 3 presents the results of the Ljung-Box Q-statistic which tests the hypothesis that all of the autocorrelations of returns up to the order specified are zero. The figures in the table are the Q-statistics and statistical significance indicates rejection of the null hypothesis.

Table 3. Autocorrelations of the Returns: Ljung-Box Q-Statistic Tests

Market	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 12
Arab Markets							
Bahrain	11.60*	19.03*	23.65*	29.96*	30.51*	32.04*	42.57*
Egypt	13.34*	27.67*	37.23*	40.60*	40.60*	41.92*	51.72*
Jordan	0.04	0.07	0.16	1.20	1.98	4.03	9.81
Kuwait	1.13	1.84	4.50	9.34	14.13*	15.38*	23.09*
Morocco	14.36*	22.85*	30.31*	41.26*	43.78*	44.32*	47.44*
Oman	6.13*	11.74*	17.92*	20.89*	25.85*	28.99*	72.57*
Saudi Arabia	11.33*	11.92*	12.95*	15.47*	15.93*	15.94*	23.06*
Tunisia	5.65*	7.10*	18.89*	18.90*	19.40*	20.47*	35.22*
Emerging Markets							
India	1.49	1.83	3.99	3.99	5.02	6.74	19.02
Mexico	0.28	0.29	0.32	0.34	2.18	2.18	6.54
Developed Markets							
Japan	1.48	3.19	3.39	5.29	5.77	7.09	11.30
United Kingdom	0.47	0.68	0.68	3.78	5.65	6.69	15.33
United States	0.17	0.18	2.45	5.16	5.25	6.92	13.96

Note: *Statistical significance at the 5 percent level.

The results show evidence of autocorrelation of the returns up to lag 12 in 7 out of the 8 Arab markets. In the case of Kuwait, evidence of serial correlation starts appearing only at lag 5. As for Jordan, it is the only market for which the null hypothesis is not rejected at all lags. With respect to the emerging and developed markets, the results do not indicate that returns contain a predictable component.

4. Volatility of Returns

In this section, two measures of volatility are presented and discussed: the coefficient of variation and the Schwert measure of volatility.

Coefficient of Variation

The coefficient of variation figures presented in table 4 measure the degree of volatility of weekly market return relatives.

Table 4. Volatility of Market Return Relatives

Market	Coefficient of Variation
Arab Markets	
Bahrain	9.31
Egypt	10.32
Jordan	25.86
Kuwait	6.29
Morocco	3.33
Oman	8.34
Saudi Arabia	36.42
Tunisia	-158.44
Emerging Markets	
India	-35.88
Mexico	15.91
Developed Markets	
Japan	-31.12
United Kingdom	5.98
United States	4.70

For the group of Arab markets, Tunisia appears to be, by far, the most volatile followed by Saudi Arabia and Jordan, with Morocco the least volatile. However, for Tunisia it should be noted that the figure is out of proportion because the mean return is almost zero. To a lesser extent, the same can be said about Saudi Arabia and Jordan. For the emerging markets, the coefficients of variation are higher on average than those for most of the Arab markets. As for the developed markets, only Japan exhibits a high level of volatility of return relatives because it has both the highest standard deviation and the lowest mean return of the group. Overall, based on the coefficient of variation, the figures do not seem to indicate any distinct level of volatility of the returns in Arab markets as a group vis-à-vis that of the other 2 groups.

Schwert Measure

Following Schwert (1989), a two-step regression technique is applied to estimate weekly volatilities from weekly returns.[10] In the first step, the weekly returns are regressed on 13 lagged values. The absolute value of the residual from this equation is an estimate of the standard deviation of the return for week t. In the second step, the absolute value of the residual from the previous equation is regressed on 13 lagged absolute values of the residuals. The fitted values from this second equation, multiplied by $(2/\pi)^{-\frac{1}{2}}$, are estimates of the conditional weekly return standard deviations given information available before week t.

After the volatility measures are estimated for each market separately, an average measure of volatility is then constructed for each group of markets. This measure is calculated by taking the weighted average of the different market volatilities, with the weights representing the share of each market in the total market capitalization of the group.[11]

---

[10] Studies which have used the Schwert measure of volatility include Kim and Singal (1993) and Richards (1996). Kim and Singal applied it only to emerging markets, and Richards to both emerging and developed markets.

[11] To calculate the weights, the following base periods are used: for Arab markets, the third quarters of 1996, 1997 and 1998; for emerging and developed markets, the end of the years 1996 and 1997.

In the case of the coefficient of variation, volatility in Arab markets (and in emerging and developed markets) has been measured at the market level. The figures in table 4 do not provide a clear assessment of the degree of volatility of returns in Arab markets as a group compared to that in the other 2 groups of markets. The Schwert measure of volatility used at the group level should reveal not only the potential trends in volatility of returns in Arab markets but also their level of volatility relative to that of emerging and developed markets. Figure 2 shows the Schwert measure of volatility for the 3 groups.

The first observation that could be made from the figure is that Arab markets as a group exhibit the lowest level of volatility and emerging markets the highest. Both emerging and developed markets show an increase in volatility, particularly over the periods corresponding to the last 2 major financial crises that the world has experienced over the last 4 years. [12] For these 2 groups, the figure also shows an upward trend in volatility starting around the time of the Russian crisis and sustained most probably because of the fear about a potential Brazilian crisis.

---

[12]The high level of volatility in emerging markets at the beginning of the sample period should be considered with caution since Mexico, the country where the first crisis originated, represents slightly more than half the total weight of the group.

Figure 2. Average Volatility of Weekly Market Returns

As to the Arab markets as a group, they do not seem to have been affected by any of the international crises. However, the figure shows a slight increase in their level of volatility beginning in the last quarter of 1997, period which corresponds to the downturn in world oil prices. As mentioned earlier in the discussion of the figure of market returns, volatility of returns in GCC markets increased over this period. Since the weight of GCC markets constitutes about 2/3 of the total weight of the group, it is evident that any increase in their level of volatility will impact noticeably upon the volatility of the group. However, the same fact about the weight distribution could be used to argue that Arab markets show the lowest level of volatility because they are the most insulated from international shocks, being as a group the least open to foreign investment of all markets included in the study.[13] Therefore, the main sources of volatility in these markets are only of two types, world oil prices and domestic factors.

Even though the 2 figures seem to indicate that Arab markets are not affected by international financial crises, it is worth completing the analysis by considering the issue of volatility spillovers. In the framework of stock market integration, it is believed that the more integrated in international markets a particular market is, the more affected by volatility in those markets it will be.[14] Therefore, by providing a measure of the degree of integration of Arab markets in international markets, it would be possible to estimate the likelihood of occurrence of volatility spillovers into Arab markets. One traditional measure of the degree of integration of stock markets in international markets is the correlation of the returns. Based on the previous results and discussion, the correlation between Arab markets and the other markets is expected to be quite low. Table 5 presents the correlation coefficients for the 3 groups of markets.

---

[13]The combined weight of Saudi Arabia and Kuwait, closed to non-GCC investors, constitutes almost 60 percent of the total.

[14]For a brief discussion of this issue, see Engle and Susmel (1993).

Table 5. Correlations of the Returns

Market	Bahrain	Egypt	Jordan	Kuwait	Morocco	Oman	Saudi Arabia	Tunisia	India	Mexico	Japan	United Kingdom	United States
Arab Markets													
Bahrain	1.000	-0.110	0.108	0.172	-0.011	0.057	0.180	-0.070	0.019	0.031	0.015	0.099	-0.047
Egypt		1.000	0.030	0.031	0.156	0.002	0.097	-0.128	-0.036	0.042	-0.135	-0.020	-0.042
Jordan			1.000	0.019	0.034	0.077	0.047	-0.113	0.066	-0.017	-0.015	0.137	0.074
Kuwait				1.000	-0.128	0.225	0.139	0.013	0.087	-0.080	0.040	0.093	0.004
Morocco					1.000	-0.041	0.057	-0.090	0.080	-0.028	-0.118	-0.132	-0.038
Oman						1.000	0.069	-0.023	0.046	0.126	0.017	0.107	0.039
Saudi Arabia							1.000	-0.033	-0.075	0.055	-0.041	0.050	0.071
Tunisia								1.000	-0.047	-0.033	-0.012	-0.089	-0.004
Emerging Markets													
India									1.000	0.075	-0.024	0.069	0.108
Mexico										1.000	0.241	0.343	0.435
Developed Markets													
Japan											1.000	0.286	0.344
United Kingdom												1.000	0.621
United States													1.000

The table presents the correlations of returns within each group and between the groups. Within the group of Arab markets, the correlations are quite low and the highest is that between Kuwait and Oman at 22.5 percent followed by that between Bahrain and Saudi Arabia at 18 percent. In fact, 4 of the highest 5 correlation coefficients involve GCC markets. The lowest correlation within the group is between Egypt and Oman at 0.2 percent. The correlation between Arab and emerging markets is very low except for that between Oman and Mexico at 12.6 percent. As to the correlation between Arab and developed markets, it is higher than 10 percent (and does not exceed 14 percent) only in 5 cases, 3 of which involve the U.K. and none the U.S.

The correlation between the 2 emerging markets is quite low, and their correlation with the developed markets is of a different magnitude. Whereas the correlation of India with those markets does not exceed 10 percent (with the U.S.), that of Mexico is significant particularly with the U.S. at 43.5 percent. As to the correlation between the developed markets, it is quite high, reaching 62.1 percent between the U.K. and the U.S.

Thus, the coefficients in table 5 clearly show that some Arab markets, the GCC markets, are relatively correlated. But this result could simply reflect a common reaction of those markets to changes in world oil prices and not necessarily the impact of developments in one market on the others. But overall, the correlation of returns between Arab markets is quite low, as is their correlation with the other markets.

5. Conclusion

The purpose of this study has been to examine whether Arab stock markets were characterized by excessive volatility. Since volatility is a relative measure, a benchmark needed to be used in order to assess the degree of volatility of Arab markets. To this end, the study included a group of emerging markets and a group of developed markets. The data set consisted of weekly stock price indexes over the period extending from October 1994 to November 1998.

After a discussion of the main characteristics of the markets covered such as market accessibility to foreign investors, market size and level of activity, the paper presented the main summary statistics of the weekly returns in these markets. Then, the issue of volatility of returns was tackled through two different measures. The first, the coefficient of variation, measures the degree of volatility of weekly market return relatives. The overall results did not seem to indicate any distinct level of volatility of the returns in Arab markets as a group relative to that of the other 2 groups, also given that the coefficient of variation measures volatility at the market level. The second measure of volatility used in this study, the Schwert measure, is obtained from a two-step regression technique and is an estimate of the conditional standard deviation of weekly returns.

The Schwert measure was used at the group level so that it could reveal not only the potential trends in volatility of returns in Arab markets but also their level of volatility relative to that of emerging and developed markets. The graphs showed that Arab markets exhibited the lowest level of volatility of returns and also that they were not affected by international financial crises. Finally, the study addressed the issue of volatility spillovers. The results indicated that Arab markets were characterized by low correlations with each other and with international markets.

One interpretation of the results on volatility of returns in Arab markets may require a differentiation between these markets. For the main GCC markets, basically closed to foreign investment, it may be difficult at this juncture to predict how their volatility will be affected when they become accessible to international portfolio flows. As to the other markets, some of which compare to the main developed markets in terms of openness, it could be that their low level of volatility reflects the small size of international portfolio flows. It could also be that their macroeconomic fundamentals are sound and their risk-return tradeoff is favorable, so that there is no ground for international portfolio flows to have a destabilizing effect. A study at the market level should shed some light on these issues.

References

Al-Loughani, N. E. 1995. "Random Walk in Thinly Traded Stock Markets: The Case of Kuwait." *Arab Journal of Administrative Sciences*, Vol. 3: 189-209.

_____ and Moosa, I. A. 1997. "Testing the Efficiency of an Emerging Stock Market Using Trading Rules: The Case of Kuwait." Working Papers Series Number 1. Kuwait University, College of Administrative Science, Kuwait.

Arab Monetary Fund. 1997. Arab Stock Markets Data Base: Arab Stock Markets Participating in the Data Base: Their Creation and Development. Special Issue. Abu Dhabi.

Arab Monetary Fund. 1998. Arab Stock Markets Data Base, Third Quarter. Abu Dhabi.

Bekaert, G. 1995. "Market Integration and Investment Barriers in Emerging Equity Markets." *The World Bank Economic Review*, Vol. 9: 75-107.

Bera, A. K. and C. M. Jarque. 1980. "Model Specification Tests: A Simultaneous Approach." *Journal of Econometrics*, Vol. 20: 59-82.

Bollerslev, T. and R. J. Hodrick. 1995. "Financial Market Efficiency Tests." In M. Hashem Pesaran and Mike Wickens, eds., Handbook of Applied Econometrics: Macroeconomics. Blackwell Publisher Ltd. Oxford.

Buckberg, E. 1995. "Emerging Stock Markets and International Asset Pricing." *The World Bank Economic Review*, Vol. 9: 51-74.

Butler, K. C. and S. J. Malaikah. 1992. "Efficiency and Inefficiency in Thinly Traded Stock Markets: Kuwait and Saudi Arabia." *Journal of Banking and Finance*, Vol. 16: 197-210.

Dahel, R. and B. Laabas. 1998. "The Behavior of Stock Prices in the GCC Markets." Paper presented at the ERF Fifth Annual Conference, August 31-September 2, Tunis, Tunisia.

Darrat, A. F. and S. R. Hakim. 1997. "Price Linkages, Efficiency, and Integration of Emerging Stock Markets in the Middle East." Paper presented at the ERF Fourth Annual Conference on Regional Trade, Finance and Labor Markets in Transition, October 7-9, Beirut, Lebanon.

The Economist. Various issues.

El Erian, M. and M. Kumar. 1995. "Emerging Equity Markets in Middle Eastern Countries." In Development of Financial Markets in the Arab Countries, Iran and Turkey. Economic Research Forum for the Arab Countries, Iran and Turkey. Cairo.

Engle, R. F and R. Susmel. 1993. "Common Volatility in International Equity Markets." *Journal of Business & Economic Statistics,* Vol. 11: 167-76.

Harvey, C. R. 1995. "Predictable Risk and Returns in Emerging Markets." *The Review of Financial Studies*, Vol. 8: 773-816.

IFC (International Finance Corporation). 1998. Emerging Stock Markets Factbook. Washington, D.C.

Kim, E. H. and V. Singal. 1993. "Opening Up of Stock Markets by Emerging Economies: Effect on Portfolio Flows and Volatility of Stock Prices." In Stijn Claessens and Sudarshan Gooptu, eds., Portfolio Investment in Developing Countries. World Bank Discussion Paper 228. Washington, D.C.

LeRoy, S. F. and R. D. Porter. 1981. "The Present-Value Relation: Tests Based on Implied Variance Bounds." *Econometrica*, Vol. 49: 555-74.

Ljung, G. and G. Box. 1978. "On a Measure of Lack of Fit in Time Series Models." *Biometrika*, Vol. 65: 297-303.

Lo, A. W., ed., 1997. Market Efficiency: Stock Market Behaviour in Theory and Practice. Edward Elgar Publishing Limited. Cheltenham.

MEED (Middle East Economic Digest). Various issues.

Richards, A. J. 1996. "Volatility and Predictability in National Stock Markets: How Do Emerging and Mature Markets Differ?" *IMF Staff Papers*, Vol. 43: 461-501.

Schwert, G. W. 1989. "Why Does Stock Market Volatility Change Over Time?" *The Journal of Finance*, Vol. 44: 1115-53.

Shiller, R. J. 1979. "The Volatility of Long-Term Interest Rates and Expectations Models of the Term Structure." *Journal of Political Economy*, Vol. 87: 1190-219.

_____ 1981. "Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?" *American Economic Review*, Vol. 71: 421-36.

Abstract*

The purpose of this paper is to investigate whether Arab stock markets are characterized by excessive volatility of returns. To this end, the study includes, in addition to eight Arab stock markets, two emerging and three developed markets. The data consists of weekly stock price indexes over the period extending from October 1994 to November 1998.

After a discussion of the main characteristics of the markets covered, the paper presents the main summary statistics of the weekly returns in these markets. Then, the issue of volatility is tackled through two different measures. The first, the coefficient of variation, measures the degree of volatility of weekly market return relatives. The overall results do not seem to indicate any distinct level of volatility of the returns in Arab markets as a group relative to that of the other two groups.

The second measure of volatility used in this study, the Schwert measure, is obtained from a two-step regression technique and is an estimate of the conditional standard deviation of weekly returns. The Schwert measure is used at the group level so that it could reveal not only the potential trends in volatility of returns in Arab markets but also their level of volatility relative to that of emerging and developed markets. The graphs show that Arab markets exhibit the lowest level of volatility of returns and also that they are not affected by international financial crises. Finally, the study addresses the issue of volatility spillovers. The results indicate that Arab markets are characterized by low correlations with each other and with international markets.

تقلبات أسعار الأسهم في الأسواق العربية

ملخص

تبحث هذه الورقة فيما إذا كانت أسواق الأسهم العربية تتميز بتقلبات زائدة في العوائد . ولهذا الغرض، تضم الدراسة، بالاضافة الى ثمانية أسواق عربية، سوقين ناشئين وثلاث أسواق متقدمة . تتألف البيانات من المؤشرات الاسبوعية لأسعار الأسهم خلال الفترة من أكتوبر 1994 إلى نوفمبر 1998 .

بعد مناقشة أهم خصائص الأسواق محل الدراسة، تقدم الورقة أهم الإحصاءات حول العوائد في هذه الأسواق . ثم تتطرق الورقة إلى قضية تقلبات الأسعار من خلال مقياسين مختلفين . الأول، أي معامل الاختلاف، يقيس درجة تقلبات العوائد النسبية . وبناءً على هذا المقياس، لا تبين النتائج الاجمالية أي مستوى واضح من التقلبات في العوائد في الأسواق العربية كمجموعة بالنسبة للتقلبات في المجموعتين الأخريين .

أما المقياس الثاني للتقلبات المستخدم في هذه الدراسة، أي مقياس شورت، فيتم الحصول عليه من خلال تقنية إنحدار على خطوتين، وهو تقدير للإنحراف المعياري المشروط للعوائد الأسبوعية . ويستخدم مقياس شورت على مستوى المجموعة وذلك من أجل كشف ليس فقط الاتجاهات المحتملة في تقلبات العوائد في الأسواق العربية ولكن كذلك مستوى هذه التقلبات بالنسبة للتقلبات في الأسواق الناشئة والمتقدمة . فتبين الأشكال أن الأسواق العربية تظهر أدنى مستوى في تقلبات العوائد وكذلك أنها لا تتأثر بالأزمات المالية الدولية . وأخيراً، تتطرق الدراسة الى قضية انتشار التقلبات إلى أسواق أخرى . فتشير النتائج إلى أن الأسواق العربية تتميز بدرجة منخفضة من الارتباط مع بعضها البعض وكذلك مع الأسواق العالمية .